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cover story

The Virtual **Supply Chain**

Part 1

The nature of the **supply chain** is changing. The profusion of network technologies within and beyond the enterprise has created more and better information moving at faster rates, resulting in leaner operations. As manufacturing executives undertake the task of optimizing their value **chain** for today's Net-based economy, they are discovering a whole new world of "e"-options.

Dave Cope, vice president of marketing and business development for Extricity Software, Redwood Shores, Calif., states, "The Internet has enabled business-to-business integration, allowing companies to link their businesses tightly with those of its value **chain** of partners to provide a quantum leap in competitiveness.

"Business-to-business integration presents an enormous opportunity for companies to create a coordinated community of partners that collaborate in a variety of areas, from planning to distribution to customer service."

He stresses the importance of companies recognizing the strategic need to compete, not as an individual organization, but as a member of a business-to-business trading-partner community where each member concentrates on their core competencies.

"Companies must take advantage of the virtual **supply chain** to remain competitive in today's marketplace," seconds Joey Benadretti, vice president of marketing, Syspro Impact Software Inc., Costa Mesa, Calif. "Those organizations failing to implement Internet-based solutions to expedite business and enhance customer service will not survive."

Ann Grackin, executive vice president of the consulting firm Avicon, Natick, Mass., agrees. "Visibility is the key today--to be much more responsive at a lower price. Firms today should start to look at visibility, rapid communication, and interenterprise integration rather than restrictive intraenterprise visibility."

Grackin goes on to explain that enterprise resource planning (ERP) systems were developed to provide an information background, and take years to build. "The whole issue of ERP does not reflect the new enterprise architecture of integrated trading communities and business-to-business relationships."

"Many of the new challenges of e-commerce and virtual **supply** chains are not addressed by traditional enterprise systems, because those systems were designed to meet a different set of challenges," adds Rob Sweeney, director of product strategy for Industri-Matematik International, Tarrytown, N.Y.

"ERP systems, and therefore almost all legacy systems in use today, were built on the foundation of 'financial control.' Fulfillment and customer service systems for e-commerce, on the other hand, revolve around an axis of 'customer intelligence.'"

For optimum benefit, he feels new business processes and supporting system capabilities must be built around a comprehensive understanding, and common view, of the customer.

In order to prepare your company for the new enterprise architecture, Avicon's Grackin says it is necessary to link your e-business strategy to the overall business strategies of the enterprise. "You must ask the questions, 'How do I want to change the business model of the enterprise?' (and) 'How do I bring the whole **supply chain** together in realtime so that I've reduced the assets and increased performance?'

"You must link your e-business strategy to these issues instead of simply thinking about creating a cool Website."

Beyond the network-enabling technologies, John Montague, senior vice president of marketing for PowerCerv Technologies, Tampa, Fla., advises taking a close look at your entire enterprise infrastructure to remain competitive. "While it is an exciting time of 'e-opportunity,' it remains imperative to scrutinize the underlying technologies used to create software applications."

With a growing number of solution providers now calling their services "e-applications," the challenge becomes separating truly Net-enabled solutions from those that are simply capitalizing on the marketing hype.

Despite the confusion, there are valuable and exciting new tools available today. In talking with solution providers for midmarket manufacturers, we've identified a representative selection of companies that have capitalized on emerging technologies to bring innovative applications to the enterprise.

No doubt about it--forward-thinking manufacturing executives are looking to transform their company's traditional **supply chain** into a virtual value **chain**.

Top value-chain solutions

Today's new networked enterprise offers unprecedented ways of both obtaining and sharing information. The following innovative, leading-edge value**chain** solutions point to the wealth of opportunities available to manufacturing enterprises to improve efficiencies and enhance customer relationships. (Note: featured companies are listed in alphabetical order).

American Software

If the new streamlined value **chain** is trending more and more to a build-to-order model, then Amer-ican Software, Atlanta, Ga., is a company perfectly positioned to deliver efficiencies in enterprise **management**.

Their Intelliprise product naturally capitalizes on American Software's hallmark feature, its integrated flow-manufacturing solution, designed to tune manufacturing with actual customer demand.

"This allows companies to eliminate finished goods and work in process inventories as they synchronize daily production to actual demand. The key here is eliminating waste throughout the **supply chain** from supplier to distribution network to the end customer," states Karin Bursa, vice president of marketing for American Software.

"Intelliprise is an integrated **supply-chain** ERP suite that was designed to incorporate trading partners at multiple levels of the organization." She explains that their company's definition of a trading partner is a customer, a supplier, or both.

"This was a critical feature, as many companies fall into the 'both' category and have historically been forced to manually 'Net' their relationships with companies that are both a customer and a supplier," Bursa explains.

Intelliprise provides this analysis at both the local level (a division) as well as at a global level for the entire organization. "This means it's easy to answer questions like, 'Who are my top ten customers? Top ten suppliers? Top ten trading partners? Does this vary by division?'" notes Bursa.

Aspect Development
Aspect Development Inc., Mountain View, Calif., has developed a unique specialty that takes advantage of Web technology to create solutions for "inbound **supply-chain management**"--managing incoming materials, parts, and suppliers--comprised of software, content, and services.

In addition to developing decision-support software based on its eXplore2000 technology, Aspect also supplies its customers with content. "Aspect's large queryable eContent databases contain information on parts and supplies from hundreds of suppliers, allowing customers to make well-informed purchasing decisions," explains Monica Procter, senior marcom specialist for Aspect.

"Aspect offers services such as customer data migration and enrichment, the development of online catalogs, and process consulting services. With these core offerings, Aspect customers can expect a 'virtual value **chain**' of up to $50 million in savings per $1 billion in revenue."

Proctor continues that Aspect offers an extremely comprehensive set of content products that span more than 6 million parts from over 1,000 suppliers. These include more than 7 million standard MRO (maintenance, repair, and overhaul) items, and over 95% of all office and computer products sold today. "We also offer the ability to publish content uniquely for each customer in customer 'Preferred Catalogs'," she concludes.

Ariba
This company may well be the "poster child" of business-to-business e-commerce. C.J. Glynn, director of corporate marketing for Ariba Inc, Sunnyvale, Calif., describes their company: "We are at the heart of the virtual value **chain**, streamlining the sales process for indirect goods and services."

Glynn continues that Ariba acts as the conduit for the "stuff" that companies buy to keep their business running. From computers to janitorial supplies, as well as any indirect goods or services, Ariba facilitates business-to-business transactions through their e-commerce solution, while providing significant cost savings to the buying organizations in the process.

"Among the benefits to suppliers is an extended reach to new perspective customers and a streamlining of the process for existing customers."

He explains that included in the Ariba solution is the ariba.com intranetwork-based application for the buying organization, deployed through browsers to end users. This component provides the end user in an organization with a one-stop shop for all operating resource needs. It enables companies to channel all spending to preferred suppliers as well as leverage economies of scale and negotiate better deals.

"Ariba was one of the pioneers in the business-to-business e-commerce market," explains Glynn. "Despite the fact that it is a fairly new market, the product reflects the rapid maturity of this solution, as it is in use at companies including General Motors, Detroit, Mich.; Cisco Systems Inc., San Jose, Calif.; Merck & Co. Inc., Whitehouse Station, N.J., Hewlett-Packard Co., Palo Alto, Calif., and others--over 40 blue chip buying organizations in total."

interBiz Supply Chain Group

BizWorks, an open solution for application integration, is the noteworthy offering from the interBiz **Supply Chain** Group (a business unit of the interBiz Solutions division of Computer Associates International Inc., Islandia, N.Y.). BizWorks connects internal and external enterprise systems, and supports Internet-based business activities.

"This framework allows clients to technologically enable established legacy business applications and extend more sophisticated levels of **management** over these applications, coupling them with emerging Web-enabled technologies," explains Cindy Jutras, vice president of product strategy.

"The framework also adds value to the now centralized information resource through advanced analysis, predictive **management**, and unique visualization techniques."

Jutras continues that BizWorks also allows an array of enterprise applications--both from within interBiz Solutions' business applications and from partner, vertical, and homegrown systems--to plug in to this new business **management** infrastructure.

In addition to allowing users to visualize the extended (virtual) enterprise in realtime, the solution provides an integrated link to multiple sources of information, both from within a specific company and from information sources on the Internet.

Using this information, executives can quickly and easily identify the factors most affecting their business.

"While neural network agent technology, in and of itself, is not a new technology, it has previously been used for very specific vertical technical applications," explains Jutras. "BizWorks applies this technology to business problems."

The framework will enable business executives to look into the future before making business decisions. It recognizes patterns, accurately anticipates business problems, and analyzes the outcomes of potential remedies, before finalizing a course of action."

Datasweep

Datasweep, San Jose, Calif., has developed a suite of Web-centric **supply-chain** manufacturing solutions that enable OEMs (original-equipment manufacturers) to more efficiently build customized products, while leveraging the benefits of contract manufacturing and the collaborative **supply chain**.

Matt Holleran, vice president of marketing for Datasweep, explains the functionality of their Advantage suite of applications: "Our solution can take a custom order online, create a work order on the virtual shop floor, and then track everything that happens to the unit during production.

"This tracking may occur on the shop floor of the OEM or on the floor of a turnkey contract manufacturer with the access and data capture being done via standard Web browser."

Holleran explains that during production, the OEM and the OEM's customers have realtime unit-level visibility into production status, change-order status, and expected ship dates across the virtual **supply chain**.

"Post production, the detailed 'as-built' report and production metrics on cycle time and quality are available to the OEM and the contract manufacturer to drive ongoing improvements in product and process."

Extricity Software
According to Extricity's Dave Cope, theirs is the only application to integrate and manage business processes--not just systems--between members of a trading-partner community.

The goal of Extricity AllianceSeries is to synchronize business interactions and information flow between communities of trading partners and value chains.

"Extricity allows for integration at the process level, thereby insulating parties from IT (information technology) complexities," explains Cope. "Also, using both public and private process capabilities, companies can maintain security and control."

Industri-Matematik
"Today's companies need to reorient their business processes and invest in information systems that can support the new business models and **supply-chain** concepts required for doing business in the emerging 'Internet-driven' economy," states Rob Sweeney.

"To address the needs of the virtual **supply chain**, Industri-Matematik provides Vivaldi, a best-in-class suite of application components focused on e-commerce fulfillment and customer service."

According to Sweeney, Vivaldi's capabilities can be grouped into three areas: advanced order **management** (for order capture, pricing and **promotions**, order tracking, and customer service), **supply-chain** execution (for warehouse **management**, global inventory control, **supply-chain** visibility, and collaboration) and customer-relationship **management**--CRM--(for marketing automation, call-center **management**, and sales automation).

Vivaldi uses customer "intelligence" to drive **supply-chain** pro-cesses in the e-commerce environment. The result is more effective customer service and fulfillment, which should increase customer loyalty.

With these capabilities, an organization can transform its enterprise to better manage customer relationships, create more effective **supply-chain** processes, and be a profitable participant in the virtual value **chain**," states Sweeney.

Industrial and Financial Systems (IFS)
"Support for e-business collaboration across the **supply chain** along with CRM,

business-performance analysis, and extended back-office support, make IFS the right solution at the right price for midsized manufacturers to evolve from the bricks of plant facilities to clicks of cyberspace," states Brian Johnson, of Industrial and Financial Systems (IFS) North America, Tucson, Ariz..

"IFS invented component technology five years ago and now can take a company quickly from status-quo operations to a full-blown dot-com company in the kind of easy, affordable steps midsized companies require," he continues.

"Although the license price may be appealing from the largest vendors, the implementation services to go along with the software remain expensive and time-consuming, even with no functional modifications. IFS Applications is easily customized with a lower total cost of ownership," Johnson explains.

"IFS is the only company to support modifications so that companies can achieve competitive differentiation and transition operations as necessary without worrying about upgrades."

IFS considers their client relationships "partnerships," and have served over 2,400 customers over 15 years of operations.

Lilly Software Associates
Lilly Software Associates Inc., Hampton, N.H., offers a complete **supply-chain** suite of products that span the **Supply Chain** Council SCOR (**Supply-Chain** Operations Reference) model, including applications to plan, source, make, and deliver.

Lilly's Scott Rich explains some of the modules or functions: "Our workflow messaging allows users to proactively push information to those that need to act on something or to be notified of an operational change, essentially shortening the cycle time in a particular business process."

Lilly supports full customer/supplier integration, from concept design to receipt/acceptance/or further needs requirements. "Our VISUAL Quality is a total-quality-assurance and business-performance-**management** software package that includes the value **chain** at every step of the day-to-day manufacturer's business activities," explains Rich.

Specific functionality includes a feature that integrates suppliers and customer with the employee-involvement module to assign employees followup tasks with customer and supplier issues, such as requests for quotes, meetings, and so forth.

Within their Product Lifecycle **Management** modules, customer and suppliers are linked to the products they buy or support. "Any nonconformances and corrective actions can be immediately sent via email to the value **chain** for immediate notification and action," states Rich.

"All of the integrated activities in our 16-module package have table-driven security and electronic signatures for employee, customer, and supplier personnel, in order to reduce paperwork and improve communication response-time," he concludes.

Pivotpoint
"Point.Man's new Extended Enterprise Edition has been designed specifically to streamline interactions along the virtual value **chain**," states Steve Haley, CEO of Pivotpoint Inc., Woburn, Mass.

"For example, we didn't just 'browser-enable' our Point.Man screens, because this doesn't address the additional security needs that arise when you open your live database to customers or suppliers.

"We realized early on that we needed 'content-sensitive' security that prevents a customer or supplier from seeing another customer or supplier's information," he continues. "You would never want a supplier to see the price you're paying his competitor, or a customer to see that you offer different terms to another customer."

Haley says Point.Man also provides a company with the ability to shield their customer from some of the 'decisions' involved in most software package transactions. "Point.Man's personalizations allow you to set up very streamlined transactions that automatically enter a lot of information like order types or source, without user intervention," he says.

"This sales-analysis information is something your in-house people should have access to enter or change, but your customer is unlikely to want to see." The personalization streamlines transactions for customers, without compromising the value or completeness of the information.

"Point.Man does all this without requiring your partners to load programs on their PCs," Haley continues. "All they need is a browser and Web access. The interface is very 'Web-like', which means there's little or no user orientation required."

Haley cautions against competitors who offer browser access to live information without security. "They are really only offering an intranet solution, because companies can't open the application to their customers and suppliers.

"Security through 'bolt-on' solutions such as specialized CRM or e-commerce applications cannot offer the immediate access to live information because of the timing complexities of running interfaces between the specialized applications and their live databases."

PowerCerv Technologies

PowerCerv Technologies has just announced their new e.Series e-commerce modules (comprised of e.Views, e.Order, and e.Commerce). "The e.Series Web applications are scheduled for release during the fourth quarter of 1999 in conjunction with the launch of the latest version of the PowerCerv ERP suite, ERP Plus v9.0, states PowerCerv's Montague.

e.Views delivers the ability to remotely view the status of any item in the value chain, anytime, from any computer in the world via a Web browser and Internet, intranet, or extranet access. Users can query and view comprehensive enterprise information including customer invoices, credit memos, on-account transactions, and open-order status.

Their e.Order module allows remote employees, customers, and vendors to conduct business-to-business transactions via an intranet or Internet connection, opening markets that were previously unserviceable due to geographical or time-zone restrictions.

It gives customers, salespeople, and employees the ability to review available inventory and place orders online, sending email confirmations at both the receipt and shipping of the order.

For companies conducting online business directly with customers, PowerCerv offers e.Commerce, a Web application that links the PowerCerv ERP Plus suite to Microsoft Site Server, Commerce Edition.

"Since e.Commerce is tightly integrated with Microsoft Site Server, Commerce

Edition, companies can use templates to quickly create an online storefront," explains Montague. "These online storefronts are also secure, integrated environments--ideal for conducting business-to-business transactions."

"We worked closely with clients, consultants, and industry experts to ensure the e.Series was built upon industry-standard technologies that will provide enduring value to e.Series users," states Montague.

PowerCerv built its Internet-centric applications upon industry standards using tools and technologies such as HTML (hypertext markup language), Microsoft Active Server Page (ASP) technology, Microsoft Internet Information Server, Microsoft Transaction Server, and Microsoft Commerce Server.

Prescient Systems

The new virtual value **chain** is not limited to the generation of information, but also involves the receipt and use of appropriate information by "knowledge workers."

Jane Hoffer, president of Prescient Systems, Ft. Washington, Pa., explains that her company is in the process of developing a Knowledge Foundation module to act as the end-user's primary tool for receiving all information--internally as well as externally--pertaining to the enterprise's **supply** and demand **chain**.

"Knowledge Foundation, an enterprise portal, will have the look of a personalized notebook page where the end user can arrange how the information on their page is viewed," she states.

"Examples of viewed information include Web pages that pertain to their business, instant access to metrics, e-commerce services, and role-based strategic information pushed to the user desktop from the knowledge base."

She continues explaining that the user can define exactly what they want the module to find and have the system proactively alert them when new information is found. "In addition," says Hoffer, "...it is now possible to bring the information from hundreds of Websites to one central location already prioritized for the user to review what they feel is important."

The objective of Prescient's approach is to not only increase productivity by having the system find the information for the user, but to also bring information the user would never find due to time constraints, or not knowing where to go to get the information.

"When interacting with potentially hundreds of partners in the value **chain** this technique will bring the most important information right to the desktop of the individual most likely to be able to take action."

In addition to searching the Web for information, Prescient's Knowledge Foundation will "crawl" corporate databases and records, including email, for information that should be presented to the user based upon their personalized criteria.

"This ability to filter information for the user will dramatically improve an employee's productivity allowing them access to the knowledge of the enterprise," Hoffer concludes.

Another area where Knowledge Foundation helps is with employee turnover. "Nobody likes when an employee leaves, but it does happen," states Hoffer. "The worst part is that there is usually a difficult transition and learning curve of information and knowledge for the new employee.

"Knowledge Foundation allows an enterprise to capture its own knowledge and pass that information on when needed--and probably in much greater detail than ever before." The result, Hoffer concludes, is a much shorter downtime when new employees come on board.

Ramco Systems Corp.
R. Shankar, marketing manager of Ramco Systems Corp., Princeton, N.J., explains that his company offers a complete solution with its "e.Applications" and "e-commerce" products. "Our suite of enterprise applications is fully Internet-enabled," he states.

Included in Ramco's offering are extranet-based solutions to share operational information with suppliers and customers. Ramco's Internet-based commerce solutions cover online ordering and securing payments for electronic storefronts and malls.

"The Ramco Internet Gateway extends the access of the enterprise applications suite. Applications can be distributed to suit the most current business needs," explains Shankar.

"Ramco's tools and utilities are provided for customers to flex and extend the solutions to keep pace with changing business needs," Shankar continues. "Extensive drilldowns allow customers to slice and dice databases from across locations to derive valuable information for action."

The solution addresses every element of the value **chain**, from sales forecasting through manufacturing to e-customers or e-suppliers.

SCT Corp.
The virtual value-**chain** solution by SCT Corp., Malvern, Pa., centers on improving customer knowledge. Mike Taylor, vice president of business strategy for SCT's process manufacturing unit, explains, "In SCT's solution, we have a great deal of added value in our built-in proactive workflow systems--for example, when a client logs on to check an order status, the salesperson is notified."

In another example, when a purchase contract is entered into the system, notification alerts are built in if the client does not buy, or is buying more than the stated contract. "Part of relationship **management** is knowing in advance, and systematically, what is happening with a customer," states Taylor.

"We consider relationships, rather than transactions or products, to be the way you should architect the flow of information in order to have a more intelligent system." Taylor says the company is very excited about their new e-commerce element, and that they have been adding clients who are buying on interest of these new capabilities.

"We are 100% focused on the process industry," he adds. "We understand their needs. The types of things we do in the process (shelf life) are managed in these applications."

Syspro Impact Software
As part of its IMPACT Encore ERP software solution, Syspro offers "virtual value **chain**" applications that include electronic data interchange (EDI), Web-enablement, customer support, and office and event automation.

According to Benadretti, their IMPACT Encore's Web-enabled applications facilitate sales-force automation and use the Internet and/or intranets to expedite ordering

process, customer support, and customer service, among other applications.

Syspro also practices what they preach, and have incorporated an interactive online Web-support system for their own applications.

"The office automation (event-management) module strives to improve workflow communication and response times, both internally and externally, by proactively monitoring events as they happen, then automatically sending email (or faxes) to inform individuals about the event," explains Benadretti.

"Events can be low stock points, receipt of goods, exceeded credit limits, and such. In addition to emails and faxes, events can trigger the running of another IMPACT Encore program, a third-party application, or the writing to a log file for later review."

Syspro also accommodates customization, providing users with a product that fits their requirements without having to do extensive reprogramming. This is particularly useful in the Office Automation module where an event has the ability to automatically trigger other applications and/or notify individuals.

webPLAN

webPLAN Inc., Kanata, Ont., was one of the original applications designed specifically for the Internet. It has recently added its webPLAN eSupply-**Chain**, a suite of native Web applications that allow customers and suppliers to collaborate and transact business with manufacturers in realtime, in a secure Internet community.

According to Darryl Praill, vice president of marketing for webPLAN, "The only client technology that's required is a browser, meaning that once the manufacturer has implemented webPLAN eSupply-**Chain**, customers and suppliers have all the tools they need to transact business in realtime.

He adds, "eSupply-**Chain** is agnostic. It doesn't know or care which ERP/MRP2 data it uses."

Randy Burgess, marketing communications director for the company, adds, "eSupply-**Chain** is true to webPLAN's pragmatic roots, in that it implements in 60 days, or less, it's easy to use, and provides a return on investment (ROI) in its first quarter of use."

"The customer has 7x24 visibility on his order and the ability to make changes to it with instant impact analysis from the manufacturer's most recent MRP data," concludes Praill.

Virtual benefits, real gains

The benefits are numerous, and the gains register directly on the bottomline for companies that make the transformation to an outward reaching, network-enabled virtual value **chain**. We have identified five key benefits here:

1. Enhanced customer responsiveness

"What we look for in the concept of the whole e-value **chain** is really how are we serving the customers and improving their needs?" states Avicon's Grackin. She suggests this evaluation be made from both a financial perspective and a customer-fulfillment perspective.

"In the 'dot.com-ing' of the universe, if we do not ultimately fulfill the expectations of the consumer, then we have not accomplished our goal."

"The key to developing profitable customers is the ability to effectively segment and differentiate customers based on their needs, develop seamless cost-effective interactions with them, and deliver unique products and services based on their unique needs," states Rob Sweeney of Industri-Matematik.

"This results in customer loyalty, and they continue to buy more and more products, which increase volumes from you and your **supply-chain** partners."

"Customer service is elevated to record levels because they are an active player in the process," adds webPLAN's Praill. "They know exactly what's going on and they have the power to change it, if they so desire."

Praill comments that manufacturers no longer need to play telephone tag, or repeatedly exchange faxes with both ends of the **supply chain**. Furthermore, customers get their orders faster because the process of placing and configuring them, suppliers committing to them, and manufacturers planning and scheduling production takes place at Web speed.

2. Improved information and collaboration
interBiz's Cindy Jutras sees information at the center of benefits resulting from virtual value chains.

"The new virtual **supply chain** will provide a single view of the widest breadth of information. This view will integrate all inter- and intrabusiness applications--as well as incorporating unlimited information from the World Wide Web--and will extend the enterprise so that companies can collaborate with suppliers and customers."

She cautions companies to insure that secure technology to selectively and securely share information is in place.

What this information will do is enable executives to conduct realtime business **management** and optimization and therefore exploit every e-business opportunity. "You'll no longer have to manage using the 'rear-view mirror' approach of traditional applications, but will be able to review potential impact before making decisions," states Jutras.

"By making it easier to communicate with customers and suppliers, companies can realize savings made possible by better inventory control and superior service," adds Syspro's Benadretti. "Syspro views the virtual **supply chain** as a proactive business tool, enabling the automatic triggering of events and/or applications if a situation occurs."

3. Broader use of open standards
Communication and the ability to collaborate are facilitated by the use of open standards and eased when a common language or platform is in place. As enterprises move to a networked business model--whether Internet, intranet, or extranet--certain emerging standards are surfacing, easing the way to a simpler way to share information.

"The use of cutting-edge technology, such as extensible markup language (XML), allows suppliers and customers to reduce the cost of doing standard transactions, in turn, improving the return on investment on their e-commerce programs," states Lilly's Rich. "XML is the universal format for structured documents and data on the Web."

"XML allows standard business transactions to be communicated over the Internet, eliminating the often extensive costs related to doing EDI through a VAN (value-added network)," he continues. "Using XML and the Internet, the cost of

communicating large amounts of data is eliminated, but the benefits of using standard business transactions, timely receipt of data, and elimination of errors remain."

4. Cost Savings

Ariba's innovative applications for e-commerce result in real business benefits and hard dollar savings for both suppliers and buyers. Their solutions address the problems that buying organizations have--fragmented spending from various suppliers at various prices and maverick buying by employees who don't know the process or don't care to use the process--that result in higher prices.

"When they are not leveraging volume discounts, companies are paying too much. The savings are in real, hard dollars," states Glynn.

He cites CIBC (Canadian Imperial Bank) Toronto, Ont., which has seen savings of between $40 to $60 million dollars; Merck's savings of $50 million dollars; and the expected savings of 5% on Hewlett-Packard's $7.5 billion purchasing budget when that company becomes fully implemented.

"This saves buying organizations real money that drops directly to bottom line," emphasizes Glynn.

In addition to the bottomline benefit to buyers, their technology enables suppliers to more efficiently do business with existing customers, as well as extends their reach to new customers.

Another form of significant cost savings can result from applications served from the Internet (or other outsourced network environment), especially for small to midsize companies.

"We are seeing an increased interest in outsourced solutions," comments American Software's Bursa. "This makes a lot of sense for companies that are establishing their **supply** chains or testing the water with their e-business strategies, as it provides tremendous flexibility as their business strategy evolves."

"Our approach spares the midsized manufacturer the expense and complication of maintaining interfaces among disparate systems with small IS staffs," adds Pivotpoint's Haley.

5. Increases in business efficiencies

PowerCerv's Montague says their e-services have been designed in response to specific trends that are emerging through the growth of the virtual value **chain.**

"The virtual value **chain** allows the most current information to be shared and business practices to be fine-tuned throughout the entire **supply chain**, resulting in enhanced business practices," he observes.

In addition, this new business model offers expanded market opportunities, instantly providing users with global market presence, 24x7x365.

Efficiency is also improved, with employees, vendors, and customers able to order direct, check inventories, and view order information in realtime. This streamlines the order-entry process and reduces the potential for errors in manual entry.

Finally, comments Montague, more productive operations result since sales personnel, vendors, and employees receive the most current information available. "Companies can further reduce personnel costs and decrease the number of

reshipments caused by incorrect orders. These savings then can be used on revenue-generating activities."

Industri-Matematik's Sweeney also predicts, "As companies embrace e-commerce, their transaction volumes will grow, an increase fueled by more customers buying more products at more frequent intervals.

"The ability to process high-transaction volumes is a must in this new 24x7x365 environment. Additionally, companies need to leverage information from across the **supply chain** to provide back to customers high-quality information--in realtime--to support the demanding Web-selling environment."

The selling environment itself will become increasingly pull-driven. "Information is the fuel of a powerful pull-driven **supply chain**," states Sweeney, "...and one that provides the horsepower to drive customer satisfaction and enterprise profitability."

The more organizations can transition to managing information, the less dependence they will have on holding physical inventory. According to Sweeney, Industri-Matematik has built their Vivaldi solution around the concept of trading inventory for information in order to arrive at their "zero inventory, 100% visibility" objective.

Montague, adds, "In the virtual value **chain**, the greatest benefit comes with the seamless integration and exchange of information among suppliers, customers, and remote employees. When this occurs, companies can redesign their business practices--creating new business models, making more informed decisions, streamlining business procedures, and reducing costs."

"While this market transformation enables forward-thinking organizations to redefine how they do business, many challenges still exist," cautions Montague of PowerCerv.

"Executives that wish to take advantage of tremendous market opportunities created by the emergence of e-commerce must be sure their enterprise software vendors have a clear vision of the appropriate tools and technologies necessary to deliver continued value to their enterprises."

"With the wave of the Internet, business is changing to a virtual orientation, and that change is happening in all tiers of the **supply chain**," states Brian Johnson of IFS. "By managing **supply**, demand, and operational costs in the most effective and efficient manner possible, business will be built, and the bridges will be crossed to the virtual collaborative communities of today and the future. Evolution is the key to e-business success."

Syspro's Benadretti concurs. "The Internet is emerging as the most popular business tool of the new millennium. It promises to alter business methodologies and dramatically impact the ways in which organizations relate to their customers.

"Those companies able to capitalize on the limitless opportunities of the Web for order placement, customer communication, product-information dispersal, and customer support will gain strategic advantages."

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